

CLAIMS

WE CLAIM:

1. A transgenic plant cell transformed by a Phosphatase Stress-Related Protein (PHSRP) coding nucleic acid, wherein expression of the nucleic acid in the plant cell results in increased tolerance to an environmental stress as compared to a wild type variety of the plant cell.
2. The transgenic plant cell of Claim 1, wherein the PHSRP is selected from the group consisting of Protein Phosphatase 2A (PP2A), and Protein Phosphatase 2C (PP2C); and orthologs thereof.
3. The transgenic plant cell of Claim 1, wherein the PHSRP is selected from the group consisting of Protein Phosphatase 2A-2 (PP2A-2), Protein Phosphatase 2A-3 (PP2A-3), Protein Phosphatase 2A-4 (PP2A-4); Protein Phosphatase 2C-1 (PP2C-1) and Protein Phosphatase 2C-2 (PP2C-2); and orthologs thereof.
4. The transgenic plant cell of Claim 3, wherein the PHSRP is selected from the group consisting of PP2A-2 as defined in SEQ ID NO:11; PP2A-3 as defined in SEQ ID NO:12; PP2A-4 as defined in SEQ ID NO:13; PP2C-1 as defined in SEQ ID NO:14; and PP2C-2 as defined in SEQ ID NO:15.
5. The transgenic plant cell of Claim 3, wherein the PHSRP coding nucleic acid is selected from the group consisting of PP2A-2 as defined in SEQ ID NO:6; PP2A-3 as defined in SEQ ID NO:7; PP2A-4 as defined in SEQ ID NO:8; PP2C-1 as defined in SEQ ID NO:9; and PP2C-2 as defined in SEQ ID NO:10.
6. The transgenic plant cell of Claim 1, wherein the PHSRP coding nucleic acid hybridizes under stringent conditions to a sequence of SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:9, or SEQ ID NO:10.
7. The transgenic plant cell of Claim 1, wherein the environmental stress is selected from the group consisting of salinity, drought and temperature.
8. The transgenic plant cell of Claim 1, wherein the plant is a monocot.
9. The transgenic plant cell of Claim 1, wherein the plant is a dicot.

10. The transgenic plant cell of Claim 1, wherein the plant is selected from the group consisting of maize, wheat, rye, oat, triticale, rice, barley, soybean, peanut, cotton, rapeseed, canola, manihot, pepper, sunflower, tagetes, solanaceous plants, potato, tobacco, eggplant, tomato, Vicia species, pea, alfalfa, coffee, cacao, tea, Salix species, oil palm, coconut, perennial grass and forage crops.
11. A transgenic plant comprising a plant cell according to any of Claims 1-8.
12. A seed produced by a transgenic plant comprising a plant cell according to any of Claims 1-10, wherein the seed is true breeding for an increased tolerance to environmental stress as compared to a wild type variety of the plant cell.
13. An agricultural product produced by the plant or seed of Claims 11 or 12.
14. An isolated Phosphatase Stress-Related Protein (PHSRP) Phosphatase Stress-Related Protein (PHSRP), wherein the PHSRP is selected from the group consisting of Protein Phosphatase 2A (PP2A), and Protein Phosphatase 2C (PP2C); and orthologs thereof.
15. The PHSRP of Claim 14, wherein the PHSRP is selected from the group consisting of Protein Phosphatase 2A-2 (PP2A-2), Protein Phosphatase 2A-3 (PP2A-3), Protein Phosphatase 2A-4 (PP2A-4); Protein Phosphatase 2C-1 (PP2C-1) and Protein Phosphatase 2C-2 (PP2C-2); and orthologs thereof.
16. The PHSRP of Claim 15, wherein the PHSRP is selected from the group consisting of PP2A-2 as defined in SEQ ID NO:11; PP2A-3 as defined in SEQ ID NO:12; PP2A-4 as defined in SEQ ID NO:13; PP2C-1 as defined in SEQ ID NO:14; and PP2C-2 as defined in SEQ ID NO:15.
17. An isolated Phosphatase Stress-Related Protein (PHSRP) coding nucleic acid, wherein the PHSRP coding nucleic acid codes for a PHSRP selected from the group consisting of Protein Phosphatase 2A (PP2A), and Protein Phosphatase 2C (PP2C); and orthologs thereof.
18. The PHSRP coding nucleic acid of Claim 17, wherein the PHSRP coding nucleic acid is selected from the group consisting of PP2A-2 as defined in SEQ ID NO:6; PP2A-3 as defined in SEQ ID NO:7; PP2A-4 as defined in SEQ ID NO:8; PP2C-1 as defined in SEQ ID NO:9; and PP2C-2 as defined in SEQ ID NO:10.

19. The PHSRP coding nucleic acid of Claim 17, wherein the PHSRP coding nucleic acid hybridizes under stringent conditions to a sequence of SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:9, SEQ ID NO:10.
20. An isolated recombinant expression vector comprising a nucleic acid of Claims 18 or 19, wherein expression of the vector in a host cell results in increased tolerance to environmental stress as compared to a wild type variety of the host cell.
21. A method of producing a transgenic plant containing a Phosphatase Stress-Related Protein (PHSRP) coding nucleic acid, wherein expression of the nucleic acid in the plant results in increased tolerance to environmental stress as compared to a wild type variety of the plant, comprising, transforming a plant cell with an expression vector comprising the nucleic acid, generating from the plant cell a transgenic plant with an increased tolerance to environmental stress as compared to a wild type variety of the plant.
22. The method of Claim 21, wherein the PHSRP is selected from the group consisting of Protein Phosphatase 2A (PP2A), and Protein Phosphatase 2C (PP2C); and orthologs thereof.
23. The method of Claim 21, wherein the PHSRP is selected from the group consisting of Protein Phosphatase 2A-2 (PP2A-2), Protein Phosphatase 2A-3 (PP2A-3), Protein Phosphatase 2A-4 (PP2A-4); Protein Phosphatase 2C-1 (PP2C-1) and Protein Phosphatase 2C-2 (PP2C-2); and orthologs thereof.
24. The method of Claim 23, wherein the PHSRP is selected from the group consisting of PP2A-2 as defined in SEQ ID NO:11; PP2A-3 as defined in SEQ ID NO:12; PP2A-4 as defined in SEQ ID NO:13; PP2C-1 as defined in SEQ ID NO:14; and PP2C-2 as defined in SEQ ID NO:15.
25. The method of Claim 21, wherein the PHSRP coding nucleic acid is selected from the group consisting of PP2A-2 as defined in SEQ ID NO:6; PP2A-3 as defined in SEQ ID NO:7; PP2A-4 as defined in SEQ ID NO:8; PP2C-1 as defined in SEQ ID NO:9; and PP2C-2 as defined in SEQ ID NO:10.

26. The method of Claim 21, wherein the PHSRP coding nucleic acid hybridizes under stringent conditions to a sequence of SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:9, SEQ ID NO:10.
27. A method of modifying stress tolerance of a plant comprising, modifying the expression of a Phosphatase Stress-Related Protein (PHSRP) in the plant.
28. The method of Claim 27, wherein the PHSRP is selected from the group consisting of Protein Phosphatase 2A (PP2A), and Protein Phosphatase 2C (PP2C); and orthologs thereof.
29. The method of Claim 27, wherein the PHSRP is selected from the group consisting of Protein Phosphatase 2A-2 (PP2A-2), Protein Phosphatase 2A-3 (PP2A-3), Protein Phosphatase 2A-4 (PP2A-4); Protein Phosphatase 2C-1 (PP2C-1) and Protein Phosphatase 2C-2 (PP2C-2); and orthologs thereof.
30. The method of Claim 29, wherein the PHSRP is selected from the group consisting of PP2A-2 as defined in SEQ ID NO:11; PP2A-3 as defined in SEQ ID NO:12; PP2A-4 as defined in SEQ ID NO:13; PP2C-1 as defined in SEQ ID NO:14; and PP2C-2 as defined in SEQ ID NO:15.
31. The method of Claim 27, wherein the PHSRP coding nucleic acid is selected from the group consisting of PP2A-2 as defined in SEQ ID NO:6; PP2A-3 as defined in SEQ ID NO:7; PP2A-4 as defined in SEQ ID NO:8; PP2C-1 as defined in SEQ ID NO:9; and PP2C-2 as defined in SEQ ID NO:10.
32. The method of Claim 27, wherein the PHSRP coding nucleic acid hybridizes under stringent conditions to a sequence of SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:9, SEQ ID NO:10.
33. The method of Claim 27, wherein the stress tolerance is increased.
34. The method of Claim 27, wherein the stress tolerance is decreased.
35. The method of Claim 27, wherein the plant is not transgenic.
36. The method of Claim 27, wherein the plant is transgenic.

37. The method of Claim 36, wherein the plant is transformed with a promoter that directs expression of the PHSRP.
38. The method of Claim 37, wherein the promoter is tissue specific.
39. The method of Claim 37, wherein the promoter is developmentally regulated.
40. The method of Claim 27, wherein PHSRP expression is modified by administration of an antisense molecule that inhibits expression of PHSRP.